

Application Number 10/028,257
Amendment dated August 23, 2005
Responsive to Office Action mailed May 23, 2005

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

Claim 1 (Previously Presented): An analytical cell for detection of an analyte, comprising:

an elongate lightguide;

an array of conduits extending through the lightguide, wherein the conduits support a migration medium;

wherein the lightguide and its surrounding medium have refractive indices selected such that light entering the lightguide is internally reflected within the lightguide to illuminate the conduits; and wherein the lightguide comprises an interior surface that is at least partially reflective.

Claim 2 (Original): The cell of claim 1, wherein the longitudinal axes of the conduits in the array are substantially parallel and coplanar.

Claim 3 (Previously Presented): The cell of claim 1, wherein the lightguide comprises a first wall with a first interior surface, a second wall with a second interior surface, and a reflective third interior surface, wherein the second wall is opposite the first wall, and the first interior surface is opposite the second interior surface.

Claim 4 (Cancelled).

Claim 5 (Previously Presented): The cell of claim 3, wherein the third interior surface is a mirror.

Claim 6 (Original): The cell of claim 1, wherein the conduits have a substantially circular cross section.

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Claim 7 (Original): The cell of claim 1, wherein the conduits have a substantially square cross section.

Claim 8 (Original): The cell of claim 1, wherein the conduits are capillary tubes.

Claim 9 (Original): The cell of claim 1, wherein the lightguide is a solid.

Claim 10 (Original): The cell of claim 1, wherein the lightguide is glass.

Claim 11 (Original): The cell of claim 10, wherein the glass is selected from the group consisting of fused silica and borosilicate.

Claim 12 (Original): The cell of claim 1, wherein the light enters the lightguide in a direction substantially coplanar with and normal to the longitudinal axes of the conduits.

Claim 13 (Original): The cell of claim 1, wherein the lightguide has a higher refractive index than the surrounding medium.

Claim 14 (Previously Presented): An analytical cell comprising a cover on a substrate, wherein the substrate comprises an array of elongate grooves, wherein a longitudinal axis of the grooves is substantially parallel, wherein the grooves are substantially coplanar and support a migration medium; and wherein the migration medium, the substrate, the cover and the surrounding medium have refractive indices selected such that a lightguide is formed when the cover is placed on the substrate, and light entering the lightguide from a direction normal to the longitudinal axis of the grooves is totally internally reflected at an interior surface of the cover and an interior surface of the substrate to illuminate the grooves.

Claim 15 (Original): The cell of claim 14, wherein the grooves have a substantially circular cross sectional shape.

Claim 16 (Original): The cell of claim 14, wherein the grooves have a substantially square cross sectional shape.

Claim 17 (Cancelled).

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Claim 18 (Previously Presented): An analytical device, comprising:

(a) a lightguide comprising:

(1) a substrate comprising an array of substantially grooves that support a migration medium, wherein the grooves are substantially coplanar and have a substantially parallel longitudinal axis, and

(2) a cover on the substrate; and,

(b) a light source outside the lightguide, wherein the source emits a decollimated light beam with an optical axis substantially coplanar with and normal to the longitudinal axes of the grooves, wherein the migration medium, the substrate, the cover and a medium surrounding the substrate have refractive indices selected such that light emitted by the light source is totally internally reflected at an interior surface of the cover and an interior surface of the substrate to illuminate the grooves.

Claim 19 (Original): The device of claim 18, further comprising a detector optically coupled with the lightguide.

Claim 20 (Cancelled).

Claim 21 (Currently Amended): The device of claim 18 ~~20~~, wherein the beam diverges in a direction normal to a plane containing the grooves.

Claim 22 (Original): The device of claim 21, wherein the beam has a divergence half angle of at least about 20° in a direction normal to a plane containing the grooves.

Claim 23 (Original): The device of claim 21, wherein the beam has a spread of no more than about 1° in a plane parallel to a plane containing the grooves.

Claim 24 (Original): The device of claim 18, wherein the substrate is a solid.

Claim 25 (Original): The device of claim 18, wherein the substrate comprises a reflective interior surface to reflect the light emitted by the source back into the lightguide.

Claim 26 (Original): The device of claim 18, wherein the substrate is a glass selected from the group consisting of fused silica and borosilicate

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Claim 27 (Original): The device of claim 18, wherein the substrate and the cover comprise a polymeric material.

Claim 28 (Original): The device of claim 18, further comprising a second light source, wherein the second light source emits a second light beam having a second optical axis substantially collinear with the optical axis of the light emitted from the light source, such that the first light beam and the second light beam illuminate the grooves from opposite directions.

Claim 29 (Previously Presented): An assay method comprising:

- (a) providing an analytical cell comprising: (1) a substrate comprising a plurality of substantially parallel elongate grooves, wherein the grooves are substantially coplanar, support a migration medium, and have longitudinal axes in a first direction, and (2) a cover on the substrate; wherein the migration medium, the substrate, the cover and a medium surrounding the substrate have refractive indices selected such that a lightguide is formed when the cover is placed on the substrate;
- (b) placing a sample on the migration medium in a groove, wherein the sample comprises a fluorescently labeled analyte;
- (c) applying an electric field across the first direction to move the analyte in the groove;
- (d) illuminating the lightguide with a light beam having an optical axis along a second direction substantially coplanar with the plane of the grooves and normal to the first direction, wherein the light entering the lightguide is totally internally reflected at an interior surface of the cover and an interior surface of the substrate to illuminate at least a portion of each groove; and
- (e) detecting an emission from the analyte.

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Claim 30 (Previously Presented): An analytical cell comprising:

- (a) a solid lightguide comprising
 - (1) a first wall with a first interior surface, a second wall with a second interior surface, wherein the second wall is opposite the first wall, and the second interior surface faces the first interior surface,
 - (2) a reflective third wall with a third interior surface, and a fourth wall opposite the third wall, and
 - (3) a surrounding medium adjacent at least one of the walls;
- (b) a plurality of capillaries configured to support a migration medium, wherein the capillaries are fixed in an array at least partially enclosed within the lightguide, wherein the longitudinal axes of the capillaries are substantially parallel and coplanar, and wherein the migration medium, the capillaries, the lightguide and the surrounding medium have refractive indices selected such that light entering the lightguide is internally reflected within the lightguide at the interior surfaces to illuminate the capillaries.

Claim 31 (Original): The cell of claim 30, wherein the first and second wall are substantially planar.

Claim 32 (Original): The cell of claim 30, wherein the third and fourth walls are substantially planar.

Claim 33 (Original): The cell of claim 30, wherein the first and second walls are substantially parallel to each other.

Claim 34 (Original): The cell of claim 30, wherein the third and fourth walls are substantially parallel to each other.

Claim 35 (Original): The cell of claim 30, wherein the third and fourth walls are substantially normal to the first and second walls.

Claim 36 (Original): The cell of claim 30, wherein the capillaries have a substantially circular cross sectional shape.

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Claim 37 (Original): The cell of claim 30, wherein the capillaries comprise a glass selected from the group consisting of fused silica and borosilicate.

Claim 38 (Original): The cell of claim 30, wherein the lightguide comprises a material selected from the group consisting of polymethylmethacrylate and polymethylpentene.

Claim 39 (Original): The cell of claim 30, wherein the third interior surface is a mirror.

Claim 40 (Previously Presented): An analytical cell comprising a lightguide, wherein the lightguide comprises:

- (1) a substrate comprising a plurality of substantially parallel grooves, wherein the grooves are substantially coplanar and have a substantially arcuate cross section;
- (2) a cover comprising an array of substantially parallel grooves corresponding to the grooves in the substrate, wherein the grooves in the cover are substantially coplanar and have a substantially arcuate cross section, and wherein at least one of the substrate and the cover further comprise a reflective internal surface; and
- (3) a plurality of capillaries in the grooves between the substrate and the cover, wherein the capillaries have a substantially circular cross section, and the longitudinal axes of the capillaries extend in a first direction to form a substantially coplanar array, and wherein the capillaries are configured to support a migration medium; wherein the migration medium, the capillaries, the substrate, the cover and a medium bordering the substrate have refractive indices selected light entering the lightguide from a second direction substantially coplanar with and normal to the first direction is totally internally reflected within the lightguide to illuminate the array.

Claims 41-45 (Cancelled).